BIOLOGICAL RESOURCES OF THE SAN FRANCISCO BAY/ SACRAMENTO-SAN JOAQUIN DELTA ESTUARY

WILDLIFE AND PLANT RESOURCES

PERSPECTIVES AND ISSUES OF CONCERN TO INTEREST GROUPS

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CHALLENGES TO THE WATERFOWL RESOURCES OF THE SUISUN MARSH

Frederic A. Reid - Ducks Unlimited, Sacramento, CA.

HISTORICAL AND MODIFIED HABITATS

The San Francisco Estuary was created from a complex interplay between tectonic processes and changing sea levels (Atwater et al. 1979). The entire estuary, made up of the San Francisco Bay, Suisun Marsh, and Sacramento - San Joaquin Delta was historically the largest contiguous tidal marsh system on the Pacific Coast of North America, and remains the largest estuary on the West Coast of the conterminous United States. The Coastal Range has blocked deltaic flows, such that passage of water must flow through the narrow opening (0.75 km) of the Carquinez Straits (Josselyn 1983). This unique geologic occurrence isolates the Delta/Suisun marsh complex inland from the Bay and separates this riverine delta from most other deltaic formations which spread out into an alluvial fan and flow directly into an ocean body.

Historically, the Suisun Marsh was composed of large tracts of salt and brackish marshes, encompassing approximately 287 km^2 from Benicia east to Collinsville (Dedrick 1989). The Suisun Marsh was then composed of 12 tidally flooded islands and inland areas, interwoven by numerous sloughs and the Bay. A gradient of tidal influence, salinities, micro-elevations, and marsh vegetation existed from Suisun Bay inland to the surrounding hills (Heitmeyer et al. 1989). The balance between saline and freshwater conditions is delicate and fluctuates seasonally. As a result plant species typical of salt and freshwater wetlands intermix, and the community is reflective of local environmental conditions (Josselyn 1983). Below mean low-tide level, vegetation was dominated by California bulrush (Scirpus californica). Between the mean low-tide and mean high-water levels, a mixture of cattails (Typha spp.), California bulrush, tule bulrush (Scirpus acutus), Olney bulrush (Scirpus olneyi), and alkali bulrush (Scirpus robustus) was present. Above the high-water level, a variety of halophytes occurred. Where salinities were high, perennial pickelweed (Salicornia virginica), saltgrass (Distichilis spicata), fathen (Atriplex patula), and gumplant (Grindelia humilus) was found. In areas of lowered salinity, brass buttons (Cotula coronopifolia) and baltic rush (Juncus balticus) were more prevalent (Josselyn 1983).

At the onset of the European occupation, there was a stable population of 50.000-55,000 Native Americans in the estuary (SFEP 1992). The term "Suisin", meaning "the place of the west wind", was given to the marsh by the Patwin Indians. Decimation of the Native American population, primarily by disease, began immediately with Spanish settlement, and almost complete obliteration occurred within 100 years. At the same time,

wetland and adjacent upland habitats bordering the estuary remained essentially unchanged for the first 75 years after settlement (SFEP 1992). Placer mining during the late 1800s resulted in the transport of millions of cubic meters of sediment down from the Sierra Nevada. This resulted in the creation of new tidal marsh along Grizzly Bay, but degradation of tidal flow and bottom substrate throughout most of the Bay. The saline soils of the Suisun Marsh were reclaimed largely to provide land for grazing, beans, grains, beets, and asparagus. Attempts were made to farm the diked lands of the Suisun Marsh through the 1950s; however, high soil and water salinities precluded most crop production, and lands now are maintained as wetlands and managed as duck clubs (Rollins 1981, Heitmeyer et al. 1989).

Tidal wetlands have declined from over 28,700 ha to just over 4,300 ha (SFEP 1992), but total wetland acreage remains little changed because of the creation of managed wetlands within private duck clubs. Estimates of current landcover suggest some 2,425 ha of mudflat, 4,323 ha tidal marsh, 19,216 ha seasonal wetland, 3,264 ha farmed wetland, 163 ha riparian forest, and 11 ha of salt ponds (SFRP 1992). The Suisun Preservation Act of 1974, Suisun Marsh Preservation Act of 1977 and the Suisun Marsh Preservation Agreement of 1987 were all passed to provide habitat integrity, continued wildlife use, and adequate water quality in tidal sloughs. Unfortunately, marsh quality, wildlife use, waterfowl hunting, and desirability of property all have declined. Water quality is maintained by large radial, salinity control gates at the east end of Montezuma Slough, which are operated twice daily in relation to tidal cycles. Ownership of the Suisun Marsh wetlands is 80% private and 20% state.

HISTORICAL IMPORTANCE TO WATERFOWL

Millions of migrant and wintering waterfowl once occupied the Suisun Marsh. Tundra swan (Cygnus buccinator) was once considered a regular winter visitor (Grinnell et al. 1918), but is now extirpated. Market hunting in the late 1800s suggests the size of Estuary waterfowl populations, where more than 182,000 green-winged teal (Anas crecca) were sold in San Francisco markets in the 1895-96 season (Grinnell et al. 1918).

Today the dominant wintering waterfowl species found in the Suisun Marsh are northern pintail (A. acuta) composing about 43% of all waterfowl counted, northern shoveler (A. clypeata) about 20%, and mallard (A. platyrhynchos) about 11% (SFEP 1992). Estimates of wintering northern pintail populations in the recent past, including the Delta, vary from 200,000 to 1.4 million (Michny 1979). Wintering waterfowl in the Suisun Bay are dominated by diving ducks and compose 7% of all waterfowl in open water habitats of the Estuary. Lesser and greater scaup (Aythya affinis and A. marila) compose 47% of the bay ducks, canvasback (Aythya valisineria) compose 30% of the bay ducks, and scoters (Melanitta spp.) compose 15% (SFEP 1992). Although the Suisun habitats are critical for migration and wintering, some waterfowl

production also occurs in the area, and is primarily limited to small numbers of mallards, gadwalls, (Anas strepera), northern pintails, and cinnamon teal (A. cyanoptera) (Anderson 1960). Recent investigations in the Suisun Marsh suggest that periodic total inundation by winter/spring flooding may substantially reduce mammalian predators and result in an increase in nesting success (McLandress, pers. comm.)

MANAGEMENT AND CONTINUED CHALLENGES

Sport hunting of waterfowl first became a common activity in California in the 1840s, and the first duck club in the state was established in 1879 in the Suisun Marsh (Stoner 1937). In 1931 the California Department of Fish and Game purchased a parcel known as Joice Island, naming it as one of the state's first wildlife refuges. Today that refuge and other tracts of the state Grizzly Island Complex occupy some 5,800 ha of the Suisun Marsh. Private duck clubs include more than 14,000 ha of managed wetlands and number some 150 ownerships. Decline of waterfowl numbers in the 1980s and recognition that a relationship existed between winter habitat quantity and quality, and waterfowl recruitment (Heitmeyer and Fredrickson 1981, Raveling and Heitmeyer 1989) motivated many private duck club owners to seek better management information.

Early management (1900-1925) within the Suisun Marsh consisted of controlling water levels with tide gates around low levees (Moffitt 1938). Lands were flooded from September until February and provided subsurface irrigations in the summer. Without adequate flushing, many ponds became saline and acidic. Other flooding strategies emphasized permanent flooding, with circulating waters available during wet periods of the year. This form of management initially favored establishment of cattails and bulrushs, but submergents such as sago pondweed (Potamogeton pectinatus) and widgeon grass (Ruppia meritima) also occurred. Leaching cycles were encouraged to reduce salts after the close of duck season (Rollins 1973, Rollins 1981), and encourage alkali bulrush, fathen, and brass buttons. The length of the leaching cycles controlled the vegetation composition (Rollins 1973, Gill and Buckman 1974). An alternative management strategy was to partially drain the area in mid summer, followed by a gradual increase in water level and circulation. This water regime promotes annual plant growth on the higher fringes and perennial and submergent growth in the lower portions of the pond.

Marsh managers now recognize that maintaining extremely dry soil conditions throughout summer on the cat clay soils of former tidal wetlands can drastically alter soil and water chemistries (Lynn 1963, Rollins 1981, Crapuchettes 1990). Drying and oxidation of low pH soils, coupled with continual input of alkaline waters, can result in highly acidic waters and sterile soils. By holding the water table at higher levels and flushing the ponds during wet winter periods, acid levels can become more

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neutral (Crapuchettes 1990). Alternating annual flooding and drying strategies may provide the most useful management strategy by reducing acidity and permitting control of perennial vegetation during dry periods (Heitmeyer et al. 1989).

At the turn of the century, mosquito abatement districts were established to reduce the potential for vector diseases around growing urban populations, many of which were located near historic wetlands (Elbright et al. 1916). The Solono Mosquito Abatement District enforced regulations restricting the fluctuating of water levels and reducing the amount of early fall water available. Several currently outlawed contaminants, such as DDT, were introduced into the Suisun Marsh to control brackish wetland mosquito species such as Aedes dorsalis and Culex tarsalis. Recent work has demonstrated that manipulation of vegetation structure and water levels may be one of the most effective means to control disease risk and still enhance waterfowl habitats (Batzer and Resh 1992). However, the Suisun Marsh has been historically important for early fall waterfowl migrants. Manipulation of water levels in August and September may conflict with the abatement of nuisance mosquitoes, and the true risk of mosquito vector diseases on humans must be weighed against the need for waterbird habitats at this critical time period.

OPPORTUNITIES

The Suisun Marsh Action Committee was formed by landowners, hunters, and conservationists to support projects that allow the Suisun Marsh to sustain itself as a productive wetland complex. Individual management plans have been prepared to guide water manipulation schedules on privately owned duck clubs. These plans need to be periodically updated with the most current management information to replicate seasonal wetland productivity. Better water management may be achieved with replacement of certain water structures and water delivery systems. One law that had formally allowed such programs was state law AB 2090 (1982). This called for a cost share reimbursement with land owners for a certain portion of their annual expenses for improvement. In the first five years of administration, this program had financed over one million dollars. Unfortunately, no state funds have been allocated to this program for the last several years. Extending funds to this program, provided that they are not diverted from other wetland restoration projects in the flyway, is important.

Periodic ditch cleaning, physical manipulation of perennial plants to set back secession, and water structure placement are necessary in this managed complex. The Suisun Marsh Resource Conservation District has provided direction for the maintenance of the infrastructure for more than 15 years. In the summer of 1993, the SMRCD was denied a renewal for its 5-year regional S.404-Clean Water Act permit from the U.S. Army Corps of Engineers, and told to develop an expensive EA or EIR. Without a

regional permit, this consortium of private landowners will be unable to replicate natural patterns of flooding in this diked system.

Restoration of wetland systems is feasible on degraded areas for both state and private wetlands. Projects which improve water quality or the ability to replicate winter water regimes on multiple private ownerships should be given priority. Restoration of seasonal wetlands on state grounds has been initiated by Ducks Unlimited and the California of Fish and Game. Since 1985, 275 ha of wetlands have been restored on Grizzly Island complex and several hundred hectares can now be flooded with the addition of a new pump facility. A complete biological and engineering design of the complex is needed. The reintroduction of tule elk at this site should not take priority over the restoration of wetlands and waterbird management. By improving water management, control of monocultures such as common reed (Phragmites sp.) will be easier and more cost effective.

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